JAVA DAYS ´99



Large Applications using Swing

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Intro



- **Swing (Java™ Foundation Classes)**
  - **Rich Visual Components Framework**
  - **MVC (Model-View-Controller) Architecture**
  - **Pluggable Look & Feel**
  - **Drag‘n‘Drop**
  - **Java 2D API**
  - **Accessibility API**

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To Swing Or Not To Swing?



- **Benefits of Swing:**
  - More sophisticated user interface for Java applications
  - GUI is standard for Java 2
    - part of JDK core
  - Contains supporting infrastructure
    - borders, actions, keymaps, text package
    - HTML support (JFC 1.1.1!)
  - MVC imposes better application design

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Performance Issues



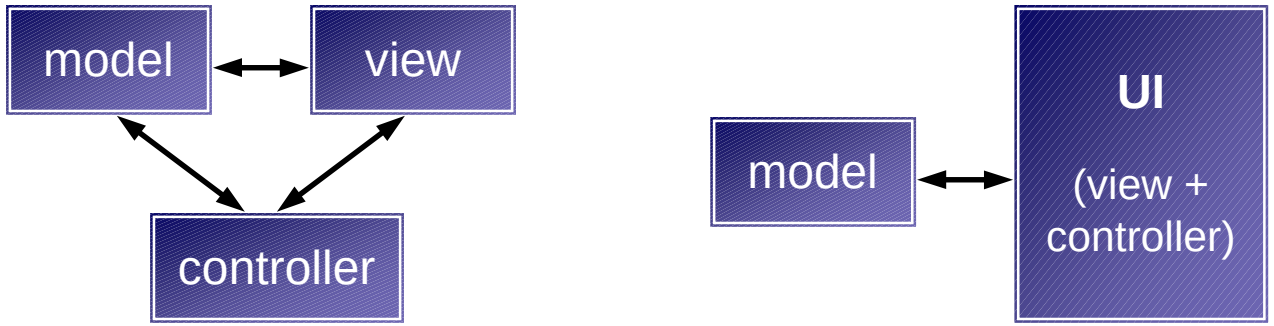
- **GUI responsiveness**
  - **windows, menu repainting**
- **Startup time**
- **Memory footprint**

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Model-View-Controller

- **Swing is hybrid MVC - Model + UI (View & Controller)**



- **Allows:**
  - **separation of presentation from data source**
  - **single view (UI) for different data sources**
  - **multiple views for single data (model)**

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MVC - Usage



- **The view can be an HTML Document generated from Servlet**
  - **same model is used**
- **Connection to data in database, EJB, …**
  - **proprietary data-aware components not necessary**

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Pluggable Look & Feel



- **Java Look & Feel**
- **Native environment Look & Feel (Win, Motif, Mac)**
- **Custom Look & Feel**
  - **company can provide its own application UI style**

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Text Package



- **JEditorPane component**
  - **syntax-colored editors, HTML editor, ...**
  - **editor kit according to MIME-type of the text is used**
    - `JEditorPane.setContentType (MIMEtype)`
  - **custom editor kits can be created to provide special features or support for more MIME types**
- **HTML & Swing**
  - **Tooltips, HTML Browser**

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Swing & Threads



- **“The single thread rule“**
  - **Swing components can be accessed by only one thread at a time.**
  - **`SwingUtilities.invokeLater (Runnable)`**
    `SwingUtilities.invokeAndWait (Runnable)`
- **Needs good separation of data and UI**

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Tips & Tricks - Performance



- **Renderers - minimize CPU-intensive code**
  - Bad Example:

```
class MyCellRenderer extends DefaultTreeCellRenderer {
  public Component getTreeCellRendererComponent(…) {
    setIcon (new ImageIcon (node.getIcon ()));
  }
}
```

  - Better Example:

```
class MyCellRenderer extends DefaultTreeCellRenderer {
  public Component getTreeCellRendererComponent(…) {
    ImageIcon image = iconCache.get (node);
    if (image == null) {
      image = new ImageIcon (node.getIcon ());
      iconCache.put (node, image);
    }
    setIcon (image);
  }
}
```


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Tips & Tricks - Startup Time



Startup Time - lazy initialization

- Bad Example:

```
class MyClass {
  static Image image = Toolkit.getDefaultToolkit ().getImage (
    getClass ().getResource (“/icons/myicon.gif”));
}
```

- Better Example:

```
class MyClass {
  static Image image;
  public Image getImage () {
    if (image == null) {
      image = Toolkit.getDefaultToolkit ().getImage (
        getClass ().getResource (“/icons/myicon.gif”));
    }
    return image
  }
}
```


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Future Of Swing



- **JDK 1.3 - Kestrel**
  - **Performance improvements !!!**
  - **Startup time & memory requirements improved**
  - **HotSpot optimized for use on clients**

	JDK 1.2.2 / HotSpot 1.0.1	JDK 1.3 Beta / HotSpot
Startup time	37 [s]	31 [s]
Compilation (SwingSet)	61/30 [s]	30/23 [s]
Memory Usage	35 [MB]	30 [MB]

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